

WHAT IS CLAIMED IS:

1. A test system for a mobile communication terminal, comprising:

- 5 a test procedure control unit which possesses
a procedure for carrying out a transition test of
a connection state of a mobile communication terminal
of a cellular system for a predetermined number of
times, and outputs control information including time
setting information in accordance with the procedure;
- 10 a transmitting/receiving unit which, in accordance
with the control information from the test procedure
control unit, generates a plurality of test signals
corresponding to a plurality of cells in the cellular
system, varies said plurality of test signals so as to
15 be successively stronger in accordance with a scheduled
time-passage and transmits the signals toward the
mobile communication terminal, and receives a response
signal from the mobile communication terminal;
- 20 a reception measurement unit which measures
a transition time that is a time when the mobile
communication terminal switches from a state of
receiving a first test signal showing the greatest
strength at the current point in time among said
plurality of test signals, to a state of receiving
25 a second test signal becoming the greatest strength
next time among said plurality of test signals
accompanying that said plurality of test signals are

varied so as to be successively stronger in accordance with the scheduled time-passage, according to the response signal from the mobile communication terminal;

5 a deciding unit which receives a measured result of the transition time from the reception measurement unit, and in accordance with the control information from the test procedure control unit, carries out a decision on success/failure whether a transition in which the mobile communication terminal switches from
10 the state of receiving the first test signal among said plurality of test signals corresponding to said plurality of cells to the state of receiving the second test signal, is a success or a failure within a predetermined time;

15 a statistical processing unit which receives a measured result of respective transition times in the predetermined number of times of the transition tests from the reception measurement unit, classifies the measured results of the respective transition times
20 into a plurality of time zones, and carries out a totalization of the number of times of the measured results of the respective transition times corresponding to the respective time zones in said plurality of time zones;

25 an indicating unit which indicates a result of the transition test of the connection state of the mobile communication terminal; and

an indication control unit which receives a result of the totalization by the statistical processing unit and results of the respective decisions on successes/failures in the predetermined number of times of the transition tests from the deciding unit, and causes the indicating unit to indicate, as the result of the transition test of the connection state of the mobile communication terminal, a distribution of the number of times of the tests with respect to a transition time by graphical indication based on the totalized results of the number of times of the measured results of the respective transition times corresponding to the respective time zones in said plurality of time zones, and to distinctively indicate the distribution so as to be able to distinguish the time zones of the successes/failures in the predetermined number of times of the transition tests.

2. The test system for a mobile communication terminal according to claim 1, wherein the statistical processing unit receives the results of respective decisions on successes/failures in the predetermined number of times of the transition tests from the deciding unit, and carries out a calculation of at least one of the successes/failures at the respective times, and

the indication control unit receives a result of at least one of the rates of successes/failures at the

respective times from the statistical processing unit,
and causes the indicating unit to plot and indicate at
least one of the rates of successes/failures at the
respective times as the result of the transition test
5 of the connection state of the mobile communication
terminal.

3. The test system for a mobile communication
terminal according to claim 2, wherein the statistical
processing unit carries out a calculation of a success
10 rate = {the number of times of successes from
the (K-N)th test to the Kth test}/N (provided that
N = a predetermined number of times), in the case where
the Kth test is currently being carried out, and
instructs the indication control unit to plot and
15 indicate the success rate for each time on the
indicating unit.

4. The test system for a mobile communication
terminal according to claim 2, wherein the statistical
processing unit carries out a calculation of a failure
20 rate = {the number of times of failures from the
(K-N)th test to the Kth test}/N, provided that
N = a predetermined number of times, in the case where
the Kth test is currently being carried out, and
instructs the indication control unit to plot and
25 indicate the failure rate for each time on the
indicating unit.

5. The test system for a mobile communication

terminal according to claim 2, wherein the statistical processing unit estimates a tendency of a calculated value of the rate from the current number of times to the scheduled number of times based on a calculated value of at least one of the rates of the successes/failures at the respective times in the past, at a stage on the way of the predetermined number of times of the transition tests, and instructs the indication control unit to plot and indicate an estimated value for each time as an estimated line on the indicating unit.

6. The test system for a mobile communication terminal according to claim 1, wherein the test procedure control unit has a computer and computer readable program code means for causing the computer to carry out a transition test of a connection state of a mobile communication terminal of a cellular system for a predetermined number of times, and outputs control information including time setting information in accordance with the computer readable program code means.

7. The test system for a mobile communication terminal according to claim 6, wherein the deciding unit, the statistical processing unit, and the indication control unit are constructed as software of the computer together with the test procedure control unit.

8. The test system for a mobile communication terminal according to claim 7, wherein the computer readable program code means comprises:

5 first computer readable program code means for causing the transmitting/receiving unit to generate a plurality of test signals corresponding to a plurality of cells in the cellular system in accordance with the control information from the test procedure control unit, to vary said plurality of test signals so as to
10 be successively stronger in accordance with a scheduled time-passage and transmit the signals toward the mobile communication terminal, and to receive a response signal from the mobile communication terminal;

15 second computer readable program code means for causing the reception measurement unit to measure a transition time that is a time when the mobile communication terminal switches from a state of receiving a first test signal showing the greatest strength at the current point in time among said
20 plurality of test signals, to a state of receiving a second test signal becoming the greatest strength next time among said plurality of test signals accompanying that said plurality of test signals are varied so as to be successively stronger in accordance
25 with the scheduled time-passage, according to the response signal from the mobile communication terminal;

third computer readable program code means for

causing the deciding unit to receive a measured result
of the transition time from the reception measurement
unit, and to carry out a decision on success/failure
whether a transition in which the mobile communication
5 terminal switches from the state of receiving the first
test signal among said plurality of test signals
corresponding to said plurality of cells to the state
of receiving the second test signal is a success or
a failure within a predetermined time, in accordance
10 with the control information from the test procedure
control unit; and

fourth computer readable program code means for
causing the statistical processing unit to receive
measured results of the respective transition times in
15 the predetermined number of times of the transition
tests from the reception measurement unit, to classify
the measured results of the respective transition times
into a plurality of time zones, and to carry out
a totalization of the number of times of the measured
20 results of the respective transition times
corresponding to the respective time zones in said
plurality of time zones; and

fifth computer readable program code means for
causing the indication control unit to receive a result
25 of the totalization by the statistical processing
unit and results of the respective decisions on
successes/failures of the predetermined number of times

of the transition tests from the deciding unit, and for causing the indicating unit to indicate, as the result of the transition test of the connection state of the mobile communication terminal, a distribution of the number of times of the tests with respect to the transition time by the graphical indication based on the totalized results of the number of times of the measured results of the respective transition times corresponding to the respective time zones in said plurality of time zones, and to distinctively indicate the distribution to be able to distinguish the time zones of the successes/failures in the predetermined number of times of the transition tests.

9. The test system for a mobile communication terminal according to claim 8, wherein the computer readable program code means further comprises:

sixth computer readable program code means for causing the statistical processing unit to receive the results of the respective decisions on successes/failures in the predetermined number of times of the transition tests from the deciding unit, and to carry out a calculation of at least one of the rates of successes/failures at the respective times; and

seventh computer readable program code means for causing the indication control unit to receive the result of the calculation of at least one of the rates of successes and failures at the respective times from

the statistical processing unit, and for causing the
indicating unit to plot and indicate at least one of
the rates of successes and failures at the respective
times as the result of the transition test of the
5 connection state of the mobile communication terminal.

10. The test system for a mobile communication
terminal according to claim 9, wherein the sixth
computer readable program code means causes the
statistical processing unit to carry out a calculation
10 of a success rate = {the number of times of successes
from the (K-N)th test to the Kth test}/N, (provided
that N = a predetermined number of times) in the case
where the Kth test is currently being carried out, and
the seventh computer readable program code means
15 instructs the indication control unit to plot the
success rate obtained by the calculation for each time
and indicate it on the indicating unit.

11. The test system for a mobile communication
terminal according to claim 9, wherein the sixth
20 computer readable program code means causes the
statistical processing unit to carry out a calculation
of a failure rate = {the number of times of failures
from the (K-N)th test to the Kth test}/N, provided that
N = a predetermined number of times, in the case where
25 the Kth test is currently being carried out, and
the seventh computer readable program code means
instructs the indication control unit to plot

the failure rate obtained by the calculation for each time and indicate it on the indicating unit.

12. The test system for a mobile communication terminal according to claim 9, wherein the sixth
5 computer readable program code means causes the statistical processing unit to estimate a tendency of the calculated value of the rate from the current number of times to the scheduled number of times based on the calculated value of at least one of the rates of
10 successes and failures at the respective times, at the stage on the way of the predetermined number of times of the transition tests, and

the seventh computer readable program code means instructs the indication control unit to plot and
15 indicate the estimated value for each time as the estimated line on the indicating unit, based on the estimation of the tendency of the calculated value of the rate from the current number of times to the scheduled number of times.

20 13. A method for testing a mobile communication terminal in the test system for a mobile communication terminal, the method comprising:

preparing a test procedure control unit which possesses a procedure for carrying out a transition
25 test of a connection state of a mobile communication terminal of a cellular system for a predetermined number of times, and outputs control information

including time setting information in accordance with the procedure;

5 in accordance with the control information from the test procedure control unit, generating a plurality of test signals corresponding to a plurality of cells in the cellular system, and varying said plurality of test signals so as to be successively stronger in accordance with a scheduled time-passage and transmitting the signals toward the mobile
10 communication terminal;

in accordance with a response signal from the mobile communication terminal, measuring a transition time that is a time when the mobile communication terminal switches from a state of receiving a first
15 test signal showing the greatest strength at the current point in time among said plurality of test signals, to a state of receiving a second test signal becoming the greatest strength in the next point in time among said plurality of test signals accompanying
20 that said plurality of test signals are varied so as to be successively stronger in accordance with the scheduled time-passage;

receiving a measured result of the transition time, and in accordance with the control information
25 from the test procedure control unit, carrying out a decision on success/failure whether a transition in which the mobile communication terminal switches from

the state of receiving the first test signal among said plurality of test signals corresponding to said plurality of cells to the state of receiving the second test signal, is a success or a failure within
5 a predetermined time;

receiving measured results of respective transition times in the predetermined number of times of the transition tests, classifying the measured results of the respective transition times into
10 a plurality of time zones, and carrying out a totalization of the number of times of the measured results of the respective transition times corresponding to respective time zones in said plurality of time zones; and

15 receiving a result of the totalization and results of the respective decisions on successes/failures in the predetermined number of times of the transition tests, and causing an indicating unit to indicate, as the result of the transition test of the connection
20 state of the mobile communication terminal, a distribution of the number of times of the tests with respect to a transition time by graphical indication based on the totalized results of the number of times of the measured results of the respective transition
25 times corresponding to the respective time zones in said plurality of time zones, and to distinctively indicate the distribution so as to be able to

distinguish the time zones of the successes/failures in the predetermined number of times of the transition tests.

14. A test system for a mobile communication
5 terminal, comprising:

test procedure control means for possessing
a procedure for carrying out a transition test of
a connection state of a mobile communication terminal
of a cellular system for a predetermined number of
10 times, and outputting control information including
time setting information in accordance with the
procedure;

transmitting/receiving means for, in accordance
with the control information from the test procedure
15 control means, generating a plurality of test signals
corresponding to a plurality of cells in the cellular
system, varying said plurality of test signals so as to
be successively stronger in accordance with a scheduled
time-passage and transmitting the signals toward the
20 mobile communication terminal, and receiving a response
signal from the mobile communication terminal;

reception measurement means for, in accordance
with the response signal from the mobile communication
terminal, measuring a transition time that is a time
25 when the mobile communication terminal switches from
a state of receiving a first test signal showing the
greatest strength at the current point in time among

said plurality of test signals, to a state of receiving
a second test signal becoming the greatest strength
next time among said plurality of test signals
accompanying that said plurality of test signals are
5 varied so as to be successively stronger in accordance
with the scheduled time-passage;

deciding means for receiving a measured result of
the transition time from the reception measurement
means, and in accordance with the control information
10 from the test procedure control means, carrying out
a decision on success/failure whether a transition in
which the mobile communication terminal switches from
the state of receiving the first test signal among said
plurality of test signals corresponding to said
15 plurality of cells to the state of receiving the second
test signal, is a success or a failure within
a predetermined time;

statistical processing means for receiving
a measured result of the respective transition times in
20 the predetermined number of times of the transition
tests from the reception measurement means, classifying
the measured results of the respective transition
times into a plurality of time zones, and carrying
out a totalization of the number of times of the
25 measured results of the respective transition times
corresponding to the respective time zones in said
plurality of time zones;

indicating means for indicating a result of the transition test of the connection state of the mobile communication terminal; and

5 indication control means for receiving a result of
the totalization by the statistical processing
means and results of the respective decisions on
successes/failures in the predetermined number of times
of the transition tests from the deciding means, and
causing the indicating means to indicate, as the result
10 of the transition test of the connection state of
the mobile communication terminal, a distribution of
the number of times of the tests with respect to
a transition time by graphical indication based on
the totalized results of the number of times of the
15 measured results of the respective transition times
corresponding to the respective time zones in said
plurality of time zones, and to distinctively indicate
the distribution so as to be able to distinguish
the time zones of the successes/failures in the
20 predetermined number of times of the transition tests.

15. The test system for a mobile communication
terminal according to claim 14, wherein the statistical
processing means receives the results of respective
decisions on successes/failures in the predetermined
25 number of times of the transition tests from the
deciding means, and carries out a calculation of at
least one of the successes/failures at the respective

times, and

the indication control means receives a result of at least one of the rates of successes/failures at the respective times from the statistical processing means, and causes the indicating means to plot and indicate at least one of the rates of successes/failures at the respective times as the result of the transition test of the connection state of the mobile communication terminal.

16. The test system for a mobile communication terminal according to claim 15, wherein the statistical processing means estimates a tendency of a calculated value of the rate from the current number of times to the scheduled number of times based on a calculated value of at least one of the rates of the successes/failures at the respective times in the past, at a stage on the way of the predetermined number of times of the transition tests, and instructs the indication control means to plot and indicate an estimated value for each time as an estimated line on the indicating means.

17. The test system for a mobile communication terminal according to claim 14, wherein the test procedure control means has a computer and computer readable program code means for causing the computer to carry out a transition test of a connection state of a mobile communication terminal of a cellular system

for a predetermined number of times, and outputs control information including time setting information in accordance with the computer readable program code means.

5 18. The test system for a mobile communication terminal according to claim 17, wherein the deciding means, the statistical processing means, and the indication control means are constructed as software of the computer together with the test procedure control
10 means.

19. The test system for a mobile communication terminal according to claim 18, wherein the computer readable program code means comprises:

15 first computer readable program code means for causing the transmitting/receiving means to generate a plurality of test signals corresponding to a plurality of cells in the cellular system in accordance with the control information from the test procedure control means, to vary said plurality of test
20 signals so as to be successively stronger in accordance with a scheduled time-passage and transmit the signals toward the mobile communication terminal, and to receive a response signal from the mobile communication terminal;

25 second computer readable program code means for causing the reception measurement means to measure a transition time that is a time when the mobile

communication terminal switches from a state of receiving a first test signal showing the greatest strength at the current point in time among said plurality of test signals, to a state of receiving
5 a second test signal becoming the greatest strength next time among said plurality of test signals accompanying that said plurality of test signals are varied so as to be successively stronger in accordance with the scheduled time-passage, according to the
10 response signal from the mobile communication terminal;
third computer readable program code means for causing the deciding means to receive a measured result of the transition time from the reception measurement means, and to carry out a decision on success/failure
15 whether a transition in which the mobile communication terminal switches from the state of receiving the first test signal among said plurality of test signals corresponding to said plurality of cells to the state of receiving the second test signal is a success or
20 a failure within a predetermined time, in accordance with the control information from the test procedure control means; and
fourth computer readable program code means for causing the statistical processing means to receive
25 measured results of the respective transition times in the predetermined number of times of the transition tests from the reception measurement means, to classify

the measured results of the respective transition times into a plurality of time zones, and to carry out a totalization of the number of times of the measured results of the respective transition times

5 corresponding to the respective time zones in said plurality of time zones; and

fifth computer readable program code means for causing the indication control means to receive a result of the totalization by the statistical
10 processing means and results of the respective decisions on successes/failures of the predetermined number of times of the transition tests from the deciding means, and for causing the indicating means to indicate, as the result of the transition test of the
15 connection state of the mobile communication terminal, a distribution of the number of times of the tests with respect to the transition time by the graphical indication based on the totalized results of the number of times of the measured results of the respective
20 transition times corresponding to the respective time zones in said plurality of time zones, and to distinctively indicate the distribution to be able to distinguish the time zones of the successes/failures in the predetermined number of times of the transition
25 tests.

20. The test system for a mobile communication terminal according to claim 19, wherein the computer

readable program code means further comprises:

5 sixth computer readable program code means
for causing the statistical processing means to
receive the results of the respective decisions on
successes/failures in the predetermined number of times
of the transition tests from the deciding means, and to
carry out a calculation of at least one of the rates of
successes/failures at the respective times; and

10 seventh computer readable program code means for
causing the indication control means to receive the
result of a calculation of at least one of the rates of
successes and failures at the respective times from
the statistical processing means, and for causing the
indicating means to plot and indicate at least one of
15 the rates of successes and failures at the respective
times as the result of the transition test of the
connection state of the mobile communication terminal.

20 21. The test system for a mobile communication
terminal according to claim 20, wherein the sixth
computer readable program code means causes the
statistical processing means to estimate a tendency of
the calculated value of the rate from the current
number of times to the scheduled number of times based
on the calculated value of at least one of the rates of
25 successes and failures at the respective times, at the
stage on the way of the predetermined number of times
of the transition tests, and the seventh computer

readable program code means instructs the indication
control means to plot and indicate the estimated value
for each time as the estimated line on the indicating
means, based on the estimation of the tendency of the
5 calculated value of the rate from the current number of
times to the scheduled number of times.